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OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			HO, ANTHONY	
ART UNIT	PAPER NUMBER			
	2815			
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	<b>Application No.</b> 10/567,929	<b>Applicant(s)</b> DUERR ET AL.
	<b>Examiner</b> ANTHONY HO	<b>Art Unit</b> 2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 29 February 2008.
- 2a) This action is FINAL.      2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) 15, 19 and 25 is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-14, 16-18 and 20-24 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)  
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) Information Disclosure Statement(s) (PTO/SB/08)  
 Paper No(s)/Mail Date 2/10/2006, 1/22/2007
- 4) Interview Summary (PTO-413)  
 Paper No(s)/Mail Date. \_\_\_\_\_
- 5) Notice of Informal Patent Application  
 6) Other: \_\_\_\_\_

**DETAILED ACTION**

***Election/Restrictions***

Claims 15, 19 and 25 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention and species, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on February 29, 2008.

Applicant's election with traverse of Group I, Species A, first sub-Specie 1, second sub-Specie a, and third sub-Specie I, wherein claims 1-14, 16-18 and 20-24 read on the elected Specie, in the reply filed on February 29, 2008 is acknowledged. The traversal is on the ground(s) that "the Examiner has not provided any indication that the contents of the claims interpreted in light of the description was considered in making the assertion of a lack of unity and therefore has not met the burden necessary to support the assertion." This is not found persuasive because contrary to Applicants arguments, the examiner has provided indication that the contents of the claims interpreted in light of the description was considered in making the assertion of a lack of unity and thus has met the burden necessary to support the assertion. This was shown in the Office Action dated November 29, 2007 and has been reproduced below:

The inventions listed as Groups 1 and 2 do not relate to a single general, inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Kymakis et al, "Single-Wall Carbon Nanotube/Conjugated Polymer Photovoltaic Devices", Applied Physics Letters, American Institute of Physics.. New York, US, Vol. 80, no. 1, 7 January 2002 (2002-01-07), pages 112-114, XP001092647 discloses a photovoltaic device, comprising a composition of carbon nanotubes and of at least one organic compound acting as a hole conductor.

The requirement is still deemed proper and is therefore made FINAL.

In addition, with respect to the Species restriction between **Species A-O**, upon further review, examiner has withdrawn the restriction requirement between **Species A-O**. However, the other restriction requirements stand as is.

***Priority***

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

***Information Disclosure Statement***

The information disclosure statement (IDS) submitted on February 10, 2006 was filed after the mailing date of the instant application on February 10, 2006. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

The information disclosure statement (IDS) submitted on January 22, 2007 was filed after the mailing date of the instant application on February 10, 2006. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

***Specification***

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-14, 16-18 and 20-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "at least one organic compound acting as a hole conductor," but it is unclear if the organic compound has to be a hole conductor or if the organic compound is any organic compound that is capable of conducting holes. Thus, one of ordinary skill in the art would not be able to define the metes and bounds of the claimed invention. Dependent claims are rejected for dependence on a rejected claim. For examination purposes, the above limitation is being interpreted as being any organic compound that is capable of conducting holes.

***Product-by-Process Limitations***

While not objectionable, the Office reminds Applicant that "product-by-process" limitations in claims drawn to structure are directed to the product, *per se*, no matter how actually made. *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also, *In re*

*Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wethheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); *In re Marosi et al.*, 218 USPQ 289; and particularly *In re Thorpe*, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product-by-process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product-by-process" claims or otherwise. Note that applicant has the burden of proof in such cases, as the above case law makes clear. Thus, no patentable weight will be given to those process steps which do not add structural limitations to the final product. In the instant application, it is noted that the recitation "said carbon nanotubes have been vertically grown" in claim 13, the recitation "wherein a hole conductor is directly grown on said carbon nanotubes" in claim 14, the recitation "...electrode coated with an evaporated layer..." in claim 20, the recitation "...a polymer substrate pre-coated with said first or said second electrode" in claim 21, and the recitation "a flexible polymer substrate pre-coated with said first or said second electrode" in claim 22 does not define any structure but rather refers to the process used to get to the final product. This is product-by-process language that has no patentable weight in the device claims.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4, 6, 8-10, 13-14, 16-18 and 21-24 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kymakis et al, "Single-Wall Carbon Nanotube/Conjugated Polymer Photovoltaic Devices," Applied Physics Letters, American Institute of Physics. New York, US, vol. 80, no. 1, 7 January 2002 (2002-01-07), pages 112-114.

In re claim 1, Kymakis et al discloses a photovoltaic device, comprising a composition of carbon nanotubes and of at least one organic compound (Figure 1; page 112, column 1, lines 24-26).

The recitation "acting as a hole conductor" in the claim specifies an intended use or field of use and is treated as nonlimiting since it has been held that in device claims, intended use must result in a structural difference between the claim invention and the prior art in order to patentably distinguish the claim invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. *In re Casey*, 152 USPQ 235 (CCPA 1967); *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). A claim containing a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art

apparatus if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

In re claim 2, Kymakis et al discloses the first and second electrodes are made of ITO and aluminum (page 113, column 2, line 9).

In re claim 3, Kymakis et al discloses the material used in the device is P3OT.

In re claim 4, Kymakis et al discloses the carbon nanotubes are a mixture of metallic and semiconducting carbon nanotubes (page 112, column 1, line 36 – column 3, line 2).

In re claim 6, Kymakis et al discloses the carbon nanotubes have a diameter of 1.4 nm (page 112, column 2, line 9).

In re claim 8, Kymakis et al discloses the band gap of at least one of the hole conductor lies in the range of from about 1 eV to 3 eV (page 113, column 1, lines 23-26).

In re claim 9, Kymakis et al discloses the LUMO of P3OT is 2.85 eV (page 114, column 1, lines 29-30), its bandgap 2.4 eV (page 113, column 1, line 24), addition of these values results in a HOMO of 5.25 eV which is greater than the HOMO of the carbon nanotubes (page 114, column 1, lines 16-17).

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In re claim 10, Kymakis et al discloses the composition comprises a mixture of carbon nanotubes and at least one hole conductor (page 112, column 2, lines 5-17).

In re claims 13-14, see note on product-by-process limitations above.

In re claim 16, Kymakis et al discloses the hole conductor is one of the listed materials, P3OT.

In re claim 17, the recitation "wherein it is an organic solar cell" in the claim preamble specifies an intended use or field of use and is treated as nonlimiting since it has been held that in device claims, intended use must result in a structural difference between the claim invention and the prior art in order to patentably distinguish the claim invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. *In re Casey*, 152 USPQ 235 (CCPA 1967); *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). A claim containing a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

In re claim 18, Kymakis et al discloses the one of the electrodes is a film or layer of a transparent material, ITO.

In re claim 21, Kymakis et al discloses a glass substrate.

In re claim 22, it is well known in the art that a flexible polymer substrate is used in photovoltaic devices.

In re claim 23, the recitation "a combination of the device according to claim 1 with a circuit, wherein the device acts as an internal power supply" in the claim preamble specifies an intended use or field of use and is treated as nonlimiting since it has been held that in device claims, intended use must result in a structural difference between the claim invention and the prior art in order to patentably distinguish the claim invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. *In re Casey*, 152 USPQ 235 (CCPA 1967); *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). A claim containing a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

In re claim 24, the recitation "a solar cell" in the claim preamble specifies an intended use or field of use and is treated as nonlimiting since it has been held that in device claims, intended use must result in a structural difference between the claim invention

and the prior art in order to patentably distinguish the claim invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. *In re Casey*, 152 USPQ 235 (CCPA 1967); *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). A claim containing a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

Claims 1, 3-4, 7-8, 11, 16-17 and 23-24 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ago et al, "Composites of Carbon Nanotubes and Conjugated Polymers for Photovoltaic Devices," Advanced Materials, VCH Verlagsgesellschaft, Weinheim, DE, vol. 11, no. 15, 20 October 1999 (1999-10-20), pages 1281-1285.

In re claim 1, Ago et al discloses a photovoltaic device, comprising a composition of carbon nanotubes and of at least one organic compound (Figure 4a; page 1284, column 2, lines 42-43).

The recitation "acting as a hole conductor" in the claim specifies an intended use or field of use and is treated as nonlimiting since it has been held that in device claims, intended use must result in a structural difference between the claim invention and the prior art in order to patentably distinguish the claim invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. *In*

*re Casey*, 152 USPQ 235 (CCPA 1967); *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

A claim containing a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

In re claim 3, Ago et al discloses the material used in the device is PPV, which is a conjugated polymer (page 1283, column 1, lines 16-18).

In re claim 4, Ago et al discloses the carbon nanotubes are a mixture of metallic and semiconducting carbon nanotubes (page 1283, column 1, line 14).

In re claim 7, Ago et al discloses MWNT as small-gap semiconductors (3-14 meV (citation [13])). As long as the band-gap of the carbon nanotube is smaller than the one of the organic compound acting as a hole conductor, a photovoltaic effect will be observed. In addition, the specification of the present application does not mention any unexpected results for a band-gap of 0.5 eV - 1 eV.

In re claim 8, Ago et al discloses the band gap of PPV is 2.4 eV (Figure 4b).

In re claim 11, Ago et al discloses the composition is a two-layer system, wherein the hole conductor is in one layer and the carbon nanotubes are in another layer (Figure 4a; page 12-81, column 2, lines 51-53).

In re claim 16, Ago et al discloses the hole conductor is one of the listed materials, PPV.

In re claim 17, the recitation "wherein it is an organic solar cell" in the claim preamble specifies an intended use or field of use and is treated as nonlimiting since it has been held that in device claims, intended use must result in a structural difference between the claim invention and the prior art in order to patentably distinguish the claim invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. *In re Casey*, 152 USPQ 235 (CCPA 1967); *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). A claim containing a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

In re claim 23, the recitation "a combination of the device according to claim 1 with a circuit, wherein the device acts as an internal power supply" in the claim preamble specifies an intended use or field of use and is treated as nonlimiting since it has been held that in device claims, intended use must result in a structural difference between

the claim invention and the prior art in order to patentably distinguish the claim invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. *In re Casey*, 152 USPQ 235 (CCPA 1967); *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). A claim containing a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

In re claim 24, the recitation "a solar cell" in the claim preamble specifies an intended use or field of use and is treated as nonlimiting since it has been held that in device claims, intended use must result in a structural difference between the claim invention and the prior art in order to patentably distinguish the claim invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. *In re Casey*, 152 USPQ 235 (CCPA 1967); *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). A claim containing a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

Claims 1, 3-6, 8, 10, 16-17 and 23-24 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Tsukamoto et al (JP 2003-096313).

In re claim 1, Tsukamoto et al discloses a photovoltaic device, comprising a composition of carbon nanotubes and of at least one organic compound (entire document).

The recitation "acting as a hole conductor" in the claim specifies an intended use or field of use and is treated as nonlimiting since it has been held that in device claims, intended use must result in a structural difference between the claim invention and the prior art in order to patentably distinguish the claim invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. *In re Casey*, 152 USPQ 235 (CCPA 1967); *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). A claim containing a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

In re claim 3, Tsukamoto et al discloses the materials used in the device (paragraph 0010; paragraph 0020).

In re claim 4, Tsukamoto et al discloses the carbon nanotubes are a mixture of metallic and semiconducting carbon nanotubes (entire document).

In re claim 5, Tsukamoto et al discloses the carbon nanotubes are a mixture of multi-walled and single-walled carbon nanotubes (paragraph 0008).

In re claim 6, Tsukamoto et al discloses the carbon nanotubes have diameters of 1 nm up to 100 nm (paragraph 0008).

In re claim 8, Tsukamoto et al discloses the band gaps of the polymers are within 1 eV – 3 eV (entire document).

In re claim 10, Tsukamoto et al discloses the composition comprises a mixture of carbon nanotubes and at least one hole conductor (paragraph 0013).

In re claim 16, Tsukamoto et al discloses the hole conductor is one of the listed materials (paragraph 0010; paragraph 0020).

In re claim 17, the recitation "wherein it is an organic solar cell" in the claim preamble specifies an intended use or field of use and is treated as nonlimiting since it has been held that in device claims, intended use must result in a structural difference between the claim invention and the prior art in order to patentably distinguish the claim invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. *In re Casey*, 152 USPQ 235 (CCPA 1967); *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). A claim containing a recitation with respect to the

manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

In re claim 23, the recitation "a combination of the device according to claim 1 with a circuit, wherein the device acts as an internal power supply" in the claim preamble specifies an intended use or field of use and is treated as nonlimiting since it has been held that in device claims, intended use must result in a structural difference between the claim invention and the prior art in order to patentably distinguish the claim invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. *In re Casey*, 152 USPQ 235 (CCPA 1967); *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). A claim containing a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

In re claim 24, the recitation "a solar cell" in the claim preamble specifies an intended use or field of use and is treated as nonlimiting since it has been held that in device claims, intended use must result in a structural difference between the claim invention and the prior art in order to patentably distinguish the claim invention from the prior art.

If the prior art structure is capable of performing the intended use, then it meets the claim. *In re Casey*, 152 USPQ 235 (CCPA 1967); *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). A claim containing a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

***Claim Rejections - 35 USC § 103***

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kymakis et al, "Single-Wall Carbon Nanotube/Conjugated Polymer Photovoltaic Devices," Applied Physics Letters, American Institute of Physics. New York, US, vol. 80, no. 1, 7 January 2002 (2002-01-07), pages 112-114 as applied to claim 1 above, and further in view of Forrest et al (US Patent 6,451,415).

Forrest et al discloses a multilayer structure for photovoltaic devices (Figure 2D). The advantage is for efficient charge carrier generation (column 8, lines 51-65). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the photovoltaic device as taught by Kymakis et al with a multilayer structure for photovoltaic devices as taught by Forrest et al in order for efficient charge carrier generation.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ago et al, "Composites of Carbon Nanotubes and Conjugated Polymers for Photovoltaic Devices," Advanced Materials, VCH Verlagsgesellschaft, Weinheim, DE, vol. 11, no. 15, 20 October 1999 (1999-10-20), pages 1281-1285 as applied to claim 1 above, and further in view of Forrest et al (US Patent 6,451,415).

Forrest et al discloses a multilayer structure for photovoltaic devices (Figure 2D). The advantage is for efficient charge carrier generation (column 8, lines 51-65). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the photovoltaic device as taught by Ago et al with a multilayer structure for photovoltaic devices as taught by Forrest et al in order for efficient charge carrier generation.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsukamoto et al (JP 2003-096313) as applied to claim 1 above, and further in view of Forrest et al (US Patent 6,451,415).  
Forrest et al discloses a multilayer structure for photovoltaic devices (Figure 2D). The advantage is for efficient charge carrier generation (column 8, lines 51-65). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the photovoltaic device as taught by Tsukamoto et al with a multilayer structure for photovoltaic devices as taught by Forrest et al in order for efficient charge carrier generation.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kymakis et al, "Single-Wall Carbon Nanotube/Conjugated Polymer Photovoltaic Devices," Applied Physics Letters, American Institute of Physics. New York, US, vol. 80, no. 1, 7 January 2002 (2002-01-07), pages 112-114 as applied to claim 2 above, and further in view of Ganzorig et al, "Alkali metal acetates as effective electron injection layers for organic electroluminescent device," Materials Science and Engineering B, Elsevier Sequoia, Lausanne, Ch, vol. 85, no. 2-3, 22 August 2001 (2001-08-22), pages 140-143. Ganzorig et al discloses the addition of an LiF, CsF or Li-acetate interlayer between the Al electrode and the organic hole conducting compound layer (Abstract). The advantage is to lower the work function of the Al layer and thus enhance hole transfer from the organic compound to the Al electrode (Abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the photovoltaic device as taught by Kymakis et al with the addition of an LiF, CsF or Li-acetate interlayer between the Al electrode and the organic hole conducting compound layer as taught by Ganzorig et al in order to lower the work function of the Al layer and thus enhance hole transfer from the organic compound to the Al electrode.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. Forrest et al (US Patent 6,580,027)

- b. Andriessen (US PUB 2004/0036067)
- c. Lu et al (US PUB 2004/0214041)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTHONY HO whose telephone number is (571) 270-1432. The examiner can normally be reached on M-Th: 10:30AM-9:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Parker can be reached on 571-272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. H./  
Examiner, Art Unit 2815

/Jerome Jackson Jr./  
Primary Examiner, Art Unit 2815